

## Claims

- [c1] A multipurpose sensing system for a vehicle comprising:  
at least one optic directed at a plurality of viewing areas;  
a single vision sensor coupled to said at least one optic  
and generating a plurality of object detection signals  
corresponding to said plurality of viewing areas; and  
a controller coupled to said vision sensor and generating  
a plurality of safety system signals in response to said  
plurality of object detection signals.
- [c2] A system as in claim 1 wherein said vision sensor generates a first object detection signal and a second object detection signal and wherein said controller generates a first safety system signal in response to said first object detection signal and a second safety system signal in response to said second object detection signal.
- [c3] A system as in claim 1 wherein said at least one optic comprises:  
a first focal point that corresponds to objects on the vehicle; and  
a second focal point that corresponds to objects external to the vehicle.

- [c4] A system as in claim 3 wherein said first focal point corresponds to moisture on a vehicle window.
- [c5] A system as in claim 1 wherein said at least one optic comprises:
  - a first focal point that corresponds to objects within the vehicle; and
  - a second focal point that corresponds to objects external to the vehicle.
- [c6] A system as in claim 5 wherein said first focal point corresponds to vehicle occupants within the vehicle.
- [c7] A system as in claim 1 wherein said vision sensor is selected from a camera, a charged coupled device, an infrared detector, and at least one photodiode.
- [c8] A system as in claim 1 further comprising a signal processor receiving and formatting said plurality of object detection signals for reception by said controller.
- [c9] A system as in claim 1 wherein said vision sensor generates said plurality of object detection signals simultaneously.
- [c10] A system as in claim 1 wherein the system is configured as to be mounted within an overhead console.
- [c11] A system as in claim 1 wherein said controller performs

sensing system operations selected from at least one of adaptive cruise control, lane-keeping control, lane-departure control, window clearing control, collision avoidance control, and countermeasure control in response to said plurality of object detection signals.

- [c12] A system as in claim 1 wherein said controller determines occupant characteristics in response to said plurality of object detection signals.
- [c13] A system as in claim 1 wherein said controller determines existence of a child safety seat in response to said plurality of object detection signals.
- [c14] A system as in claim 1 further comprising a reflective device, said vision sensor generating at least one object detection signal in response to at least a portion of a view from said reflective device.
- [c15] A system as in claim 12 wherein said reflective device is a mirror.
- [c16] A method of performing a plurality of sensing system operations within a vehicle comprising:
  - monitoring a plurality of viewing areas;
  - generating a plurality of object detection signals from a single vision sensor corresponding to said plurality of viewing areas;

generating a plurality of safety system signals in response to said plurality of object detection signals; and performing the plurality of sensing system operations in response to said plurality of safety system signals.

- [c17] A method as in claim 16 wherein monitoring a plurality of viewing areas comprises monitoring a first viewing area on the vehicle and a second viewing area external to the vehicle.
- [c18] A method as in claim 16 wherein monitoring a plurality of viewing areas comprises monitoring a first viewing area internal to the vehicle and a second viewing area external to the vehicle.
- [c19] A method as in claim 16 wherein generating a plurality of object detection signals comprises generating at least one object detection signal in response to at least a portion of a view from a reflective device.
- [c20] A multipurpose sensing system for a vehicle comprising:
  - a multi-focal lens having a first focal point corresponding to a first viewing area and a second focal point corresponding to a second viewing area;
  - a reflective device directed at said second viewing area;
  - a vision sensor coupled to said bi-focal lens and generating a first object detection signal with respect to said

first viewing area and a second object detection signal with respect to said second viewing area as is reflected from said reflective device; and  
a controller coupled to said vision sensor and generating a first safety system signal in response to said first object detection signal and a second safety system signal in response to said second object detection signal.